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revision and enlargement by means of fresh observations, tests, and trials. Failing to obey this maxim, science easily degenerates into dogmatism, and philosophy into barren intellectualism. But the other side of the shield cannot be ignored. No sooner is the intuition secured than, by the inherent logic of the mental life, it is put in conceptual form, the form of ideas. Otherwise it will remain isolated and sterile, incapable of serving the ends of pure knowledge or of practical activity. The intuition is merely an immediate datum and is unrelated to our mental life as an organized system of ideas. To pass current either in our own world or in that of our fellows it must receive the stamp of the concept. From the circle in which we pass from immediacy to reflection, from intuition to conception, and then back again, there is and can be no escape. But to attribute to any so-called intuitions our ideas of free-will, spirituality, becoming, evolution, or creation, is a strange and misleading confusion; every one is a concept, the work of reflection upon a vast number of immediate experiences.

WALTER GOODNOW EVERETT.

BROWN UNIVERSITY.

Les Étapes de la Philosophie mathématique. Par LÉON BRUNSCHVICG. Paris, Félix Alcan, 1912.—pp. xi, 591.

This substantial work, which may be described as an attempt at a philosophy of mathematics on an historical basis, is divided into seven books. The first six of these books are in the main historical, giving something of the history of mathematical science as well as of mathematical philosophy. In the last book the author gives his own views in the form of a digest of the previous historical material. As the titles of the different books indicate, the author has endeavored to combine the topical with the chronologic treatment of the subject, and this he has skillfully accomplished by means of very generous omissions. Thus the book on arithmetic ends with Pythagoras, and the next book, on geometry, begins with Plato. The book on the evolution of arithmetism, coming after the criticism of Kant and Comte, deals rather lightly with the arithmetical ideas of Cauchy, Renouvier and Méray. Thus the whole history of arithmetic from the days of Pythagoras to almost the middle of the nineteenth century is omitted, and with it all attempt to estimate the leading arithmetical ideas of men like Gauss or what is technically called the theory of numbers. Similarly M. Brunschvicg dispenses with any systematic treatment of the significance of modern work on the theory of surfaces, line geometry, theory of functions, or vector analysis.

Non-metrical geometry, which some have regarded as one of the most original creations of the nineteenth century, is hardly mentioned (Von Staudt's name does not occur at all). In view of the vast amount of ground covered in this volume, these omissions (like the omission of any reference to the influential though superficial views on mathematics of men like Mill and Schopenhauer), would not be noted except for M. Brunschvicg's assertion (p. vii) that only in a complete survey of the progress of mathematical thought can truth be secured.

The three chapters which constitute Book I, are devoted respectively to the arithmetical operations of 'primitive' peoples, the mathematical content of the Rhind Papyrus, and the Pythagorean philosophy. No logical coherence of these topics is claimed, nor is there any intention to regard the Pythagorean philosophy as on the same level or 'stage' as 'primitive' or Egyptian thought. The reason given for bringing these topics together is that it is necessary to study the mathematical processes of naïve intelligence as well as the body of reflective thought. (M. Brunschvicg uses instead of the latter, the term *dogmatic.*) There is no attempt, however, to show any vital or organic connection between the dogmatic thought of Pythagoras and the unreflective thought embodied in contemporary Greek mathematics. M. Brunschvicg does, undoubtedly, give us many ingenious suggestions as to how reflection on the problems of mathematics determined the philosophy of Plato, Descartes, and Kant, but he never asks the question, why reflective thought, or the dogmatic tradition, arises at all? If he had, he might not have so readily accepted the prevailing misology which regards all dogmatic or philosophic systems as bodies of death, shutting up spontaneous thought, and having no function except the 'bookish' or pedagogic one.

Although Book II is entitled Geometry it by no means restricts itself to that topic, but contains very suggestive accounts of the mathematical philosophy of Plato, Aristotle, Euclid, and the Cartesian school. It seems rather peculiar that Pythagoras should be treated only under the head of arithmetic, and not at all under the head of geometry. But, according to M. Brunschvicg's theory (in which he follows Milhaud), the Pythagorean philosophy considered only finite integers as real, and the discovery of incommensurables lead to its breakdown and to the rise of the Platonic philosophy. This view offers grave difficulties, especially in view of the contributions which the Pythagoreans undoubtedly made to geometry and the antiquity which Aristotle attributes to the discovery of incommensurables; but it offers a very effective approach to the philosophy of Plato which is thus presented as an effort to show that the intelligible extends beyond the realm of numbers. The Platonic method is shown to consist in the regressive analysis of the sensible data until we come to fundamental hypotheses, and these by a dialectic process are deduced from supersensible principles. The first part of this, the belief that the function of thought is one of analysis, that it is exercised with the aid of the science of numbers and figures, and that step by step it discovers the mathematical relations in the texture of phenomena (p. 70), M. Brunschvicg regards as the essence of positive science and the truth of philosophy, and in that sense Plato did succeed in extracting from mathematics a universal method; but the second part, connecting the mathematical numbers with Ideas or ideal numbers, led to obscurity which caused the downfall of the whole Platonic system, and its replacement by that of Aristotle until the Renaissance. Here, as elsewhere, the author confuses the stages of his discourse with the facts of real history. In point of fact, of course, Platonism did not suffer any such fall or total eclipse, and in the form of Neo-Platonism at least (which does not happen to interest M. Brunschvicg), it kept up a rather vigorous existence. Moreover, the neo-Platonism of the Renaissance was not, as he supposes, altogether positivistic, but full of metaphysical speculation, as the writings of Kepler and Galileo amply testify.

Although Aristotle is painted as an empiricist, founding his organon on biologic science, and discarding the Platonic metaphysic (or metamathematics), still our author seems to have for him very little intellectual sympathy. If Platonism is "the science of the connection between ideas—real science," Aristotelianism is "apparent science, the science of verbal classification" (p. 45). M. Brunschvicg seems to be under the impression that Aristotle got his categories from the grammars of his day, and his grasp of Aristotle's thought in this connection is shown by the fact that he does not discuss the latter's theory of predication or the importance of the category of *οὐσία*. Possibly if he had, he would not have made the astounding and indefensible identification of the modern logistic movement with the syllogistic of Aristotle, since the former involves a radical criticism of the substantive-attribute theory of predication. In this connection it is well to note that it is essential to Aristotelianism to restrict mathematics to quantity, which modern logistics certainly does not. M. Brunschvicg also admits that the view of modern logic which reduces the major premise to an hypothesis is a departure from the Aristotelian theory.

It is significant of our author's own thought that he does not sympathize with Aristotle's effort to get from the order of knowing to the order of being (p. 79).

The *Elements* of Euclid is regarded as the product of the same spirit as the *Analytics* of Aristotle. Both succeeded in acquiring the appearance of eternal truth independent of historical origins (p. 85). But while outwardly modeled on the Aristotelian logic of classes, the material for a logic of relations is found in the *Elements*, especially in the books on proportion and on irrationals. But the Greeks could not free themselves from the view that mathematics is necessarily a qualitative study of quantity. It required the technical extension of modern mathematics, before the Cartesian generalization of geometry could become possible. By extending Algebra over the realm of geometry the Platonic idea of a universal mathesis is revived, and the algebraic equation becomes "the reason of the determination of the universe" (p. 121). Quantity is no longer drawn by abstraction from the observation of things, but is established a priori by the power of reason (p. 123). There is, to be sure, still in Descartes a certain amount of dualism between spatial quantity and pure algebraic quantity, but these are united into one by Malebranche and Spinoza. In the latter's *Ethics*, mathematics again becomes the science of pure ideas or reality (pp. 147–148).

Book III, dealing with the development of the infinitesmal calculus, and especially with the philosophy of Leibniz, seems to be merely an elaborate interlude or mere episode in this intellectual drama; for in Book IV, devoted to Kant and Comte, the Cartesian thought is resumed and space remains "with Kant the necessary mediator, with Comte the privileged mediator, for the connection of the abstract relations which constitute science, and the empirical facts which constitute reality" (p. 341). Thus the logic of spatial relations continues to dominate science. But the discovery of non-Euclidean geometry has shown that mathematics does not give us a unique determination of space, and the development of analysis has shown that the latter is not dependent on spatial intuition, while the development of physics has shown that the classical mechanics is not the only possible scientific view of the physical world. Hence, according to M. Brunschvicg, the reaction against the logic of spatial relations in the latter part of the nineteenth century. This reaction naturally takes the form of a Neo-Pythagoreanism, or revival of a philosophy or logic of numbers, and a Neo-Aristotelianism or revival of the logic of classes. Books V and VI are devoted to these two movements respectively.

Book V, on the Evolution of Arithmetism, is the shortest in the volume and seems to grow out of a preconceived scheme rather than out of its subject matter. It treats in the main of two topics: (1) the arithmetization of modern analysis, and (2) a certain French philosophic movement rightly called *finitisme* (Renouvier, etc.). The treatment of the former topic is very inadequate. M. Brunschvicg does not seem to realize that the movement began at the end of the eighteenth century with the work of Gauss, and even as far back as Lagrange, and that it is essentially part of the effort of modern mathematics to insist on absolute rigor in demonstration and to eliminate spatia lintuition, because the later—apart from Non-Euclidean geometry—is often misleading and almost always inadequate. The result of this purely technical movement has been to establish methods for our calculus or analysis that are demonstrably just as rigorous as the methods of finite arithmetic. Now the establishment of this homogeneity between the finite integers and other mathematical entities like irrationals, complex numbers etc. (the latter being operations of integers), does certainly render the position of *finitisme* (Renouvier, Evellin, etc.) untenable, but it does not seem to be decisive of the question of nominalism with which M. Brunschvicg connects it. Those who believe that imaginaries, etc., are pure fictions or nominal symbols must now believe that 2 or 7 are likewise so, whereas those who hold integers to represent something objective in nature, must now hold complex and higher numbers to be equally objective. The whole question really depends on whether we shall call all operations or transformations 'mental,' and to the solution of this question mathematics supplies only part of the material.

It might be noted, to the discomfiture of M. Brunschvicg's historical schematism, that the position of Renouvier that only finite integers are representative of reality, is really a reassertion of the Aristotelian doctrine that all actuality is finite and the infinite never more than potential; while logistic philosophers like Mr. Russell are in fact *Platonic* realists. However, M. Brunschvicg's sins in the sixth book, are more serious than schematic illusions.

This sixth book consists of three chapters, one giving an account of the formation of the logistic philosophy of mathematics, and the other two the author's criticism of the work of Mr. Russell.

The development of this philosophy is traced to the growth of symbolic logic and to the *Mengenlehre* of Cantor. The purely philosophical motives such as those which Russell owes to Moore are ignored,—probably because M. Brunschvicg does not think it necessary to inform himself carefully about contemporary English philosophy (see his reference to Reid, p. 390), and seems to be unaware of the existence of a problem about the nature of judgment. But even the technical mathematical influences are not adequately appreciated. The account of the development of symbolic logic is based on insufficient secondary sources (see e.g. his reference to Peirce, p. 379), so that he does not realize how completely the logic of classes is subordinated in modern symbolic logic. While the account of the influence of Cantor's work is somewhat more satisfactory, M. Brunschvicg's schematism makes him miss here the predominant importance of the arithmetization of mathematics. The latter movement has furthered the main logistic thesis, viz., the identity of *pure* mathematics and symbolic logic, first by insisting on rigorous logical proof where formerly we were satisfied to rely on self-evidence or intuition, and secondly, by making the field of mathematics more homogeneous, it has pressed the necessity of greater generality in the definition of the fundamental operations of arithmetic. What, for instance, do we mean by *multiplication*, if this process applies to series? Here, contrary to M. Brunschvicg's assumption of the complete futility of symbolic logic for mathematical investigations (p. 426), symbolic logic becomes a real and needed help in mathematical research.

Although M. Brunschvicg puts his criticisms of the logistic philosophy in historical form, they are, in the vicious sense, a priori, *i. e.*, they are based on assumed self-evident principles which the subject matter in no way necessitates. Among the principles which M. Brunschvicg assumes, and from which he argues are: (1) that all logic is purely analytic, in the sense that it is based on the principle of identity, and hence there can be nothing in the conclusion which was not already in the premises; and (2) that truth can relate only to actually existent entities, hence a pure mathematics or symbolic logic which applies as well to physically non-existent entities must be futile for real 'science.' Now if the claims of modern logistics are inconsistent with these principles, may we not venture to ask whether perhaps these principles are false?

Let us consider the matter from the point of view of the enlightened empiricism which M. Brunschvicg professes and which insists on an examination of the facts of a case instead of an obstinate reliance on preconceived principles which tell us that certain facts cannot possibly be.

The fundamental thesis of the logistic movement is that the whole of what we call pure mathematics can be logically deduced from certain principles which are also the principle of symbolic logic. This deduction they claim not only as possible but as actually having been accomplished in diverse works of which Russell's *Principles of Mathematics*, and Whitehead and Russell's *Principia Mathematica* may be taken as examples. Obviously the only way to answer this claim is not to keep on shouting forever: "This is impossible because logic can never give us anything but tautologies;" but to show that this alleged deduction or derivation breaks down at definite points. This is precisely what M. Brunschvicg does not do. Indeed there is strong evidence of the fact that he has not read the *Principia* at all, or the *Principles* with any care. The evidence for this serious charge against one who writes as an historian and claims for his judgment the character of being in some sense definitive (p. 394), is to be found in his claim that the whole of Russell's system is founded on the Aristotelian logic of classes and on an ontologic realism as to the existence of these classes. As a matter of fact the logic and ontology of classes figures very slightly in the main argument of the *Principles* and not at all in the *Principia*. Explicitly and emphatically the authors of the *Principia* point out that the ontologic existence of classes is in no way necessary for the argument; and the theory of types constructed to do away with the difficulty in the notion of a class of all classes is already indicated in the appendix to the *Principles*.

The other objections brought against the logistic position are based on the same lack of familiarity with the content of the *Principia* or *Principles*. Thus one chapter is devoted to an attack on the idea of an absolute deduction. But the *Principia* explicitly disclaims the idea of an absolute deduction and merely claims that the principles it sets up are sufficient to enable us to deduce the laws of mathematics from them; and while in the *Principles* Russell does argue for the Newtonian conception of absolute time and space, and the real existence of points and instants, his arguments only prove that the Newtonian position does not involve any self-contradiction, and can, therefore, logically exist. A careful reading of the *Principles*, however, shows that this argument is not a necessary part of the main thesis, and Mr. Russell, if I understand him, has already modified his position in regard to the absolute existence of points. But even if he has not, it would seem fair to demand of a historian that he distinguish between the fundamental thesis of an important intellectual movement and the particular beliefs of its most noted philosophical representative.

Another set of difficulties assigned as the cause of the alleged dissolution of the logistic philosophy, is the difficulty arising from an analytic interpretation of mathematics. Assuming quite needlessly that all logical procedure must be analytical, M. Brunschvicg finds in Russell's and Couturat's assertion about mathematical judgments being synthetic, evidence of the bankruptcy of logistics which professes to carry out the Leibnizian idea of a universal calculus and to be opposed to the Kantian view of a synthesis founded in a priori intuition. The procedure of this argument is based on a violent refusal to understand what is really very clearly stated. Russell, in his *Principles* and especially in his book on Leibniz, and Couturat in his *Principes*, very clearly and explicitly point out that logic cannot be founded exclusively on the principle of identity. This, however, is in no way an argument for the Kantian position that the proposition $7+5=12$ is logically indemonstrable or based on sensory intuition. That logical procedure involves some form of *intellectual* intuition or apprehension is, of course, necessary for the logistic position, and Russell and Couturat have clearly admitted it. In this connection M. Brunschvicg might be reminded that, according to his own account, the Aristotelian syllogism involves more than the principle of identity (whence the dogma, nothing in the conclusion which was not already in the premises), and that there is a tinge of biologic analogy in the Aristotelian conception of two premises uniting to generate a conclusion.

Still another argument against the logistic position appears incidentally (p. 402), but is very significant of the author's own position. According to the logistic position *pure* mathematics is not concerned with the truth of any proposition asserted, but only with the question of whether it does or does not imply another proposition. Now as false propositions also have implications, Mr. Brunschvicg is led to the view that the truths of pure mathematics can be of no significance for an objective science. "Truth that one could find in the highest degree in the logical fancies of an Edgar Poe or in the development of a systematic delirium, is surely not the categoric and intrinsic truth which is the condition of scientific knowledge" (p. 402). This is a popular fallacy based on the false belief that truth and science can deal only with the actual. If this were true there could be no such a theory as pure arithmetic. $2+2=4$ would be true only if actual chairs or tables were referred to. It would have no meaning when applied to the operations of a frictionless engine. This view, however, would make a science of physics impossible. Consider the situation when we have two rival physical hypotheses. Of the two surely only one can represent the actual facts.

If from a false hypothesis no conclusion could be drawn, we would have to know which hypothesis is true before we could draw any consequences, but the drawing of consequences would be entirely unnecessary. The actual procedure of physical science does assume that hypothesis and consequences are bound together by strict laws, even when the former is false; otherwise it could not pass from the (factual) falsity of the consequences to the falsity of the hypothesis. Pure mathematics and symbolic logic simply confine themselves to the study of these implications, and the distinction between the actual and the possible can have no meaning in pure mathematics. Hence also pure mathematics must be allowed to enjoy a certain autonomy or relative independence of physics, which, indeed, our author sometimes admits (*e. g.*, p. ix) although this admission is, of course, inconsistent with his refusal to admit a valid distinction between pure and applied mathematics and the kinds of truth involved in each (p. 453).

The alleged breakdown of the logistic philosophy leads to the final stage, the philosophy of intuition, on the basis of which our author elaborates his own philosophy of mathematics,—the final book (Book VII) being entitled "Mathematical Intelligence and Truth." As, however, he claims this philosophy to be the direct result of history it is well to examine the methodological ideas which underly this attempt to found a philosophy of mathematics on history.

To the idea that history can enable us to solve the perplexing problems of our own day, M. Brunschvicg joins the related but distinct idea that the history of mathematical science is necessary to make the philosophy of mathematics intelligible. Now there can be no doubt that in order to understand the various mathematical philosophies of history we must know the character of the mathematical science with which they had to deal. The opaqueness of the usual accounts of the Platonic, Cartesian or Leibnizian philosophies of mathematics by historians unacquainted with the history of mathematics amply illustrates this truth. The interests of historical understanding, however, are not always identical with those of doctrinal evaluation. In discussing historically a philosophy like the Kantian we need to know the ideas of mathematics and mathematical physics of his own day, and the introduction of subsequent discoveries as to the adequacy or inadequacy of these ideas is likely to confuse our historical understanding. This point, at any rate, is insisted on in other fields of history.[1] Moreover, as M. Brunschvicg himself assumes, philosophers have not always kept in touch with contemporaneous science. Thus in spite of all the work in modern geometry, analysis, and mechanics, Neo-Kantians like Natorp, still insist that we have à priori knowledge that space is Euclidean and that a non-Newtonian mechanics is forever impossible. The truth is that the problems of the philosophy of mathematics have always been profoundly influenced by general considerations arising from sources foreign to mathematical science, *e. g.*, biology, ethics, etc. Hence M. Brunschvicg's thesis of a perfect parallelism between the ' stages ' of mathematical science and the ' stages ' of mathematical philosophy is not maintainable; and, as a matter of fact, it is seldom very useful.

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[1] See the Presidential addresses of Lea and Dunning before the American Historical Association 1903, and 1913, in *American Historical Review*, 1904, and 1914.

The second idea, that historical study of itself can enable us to settle controversial problems, is, judging by the frequency of historical introductions to all sorts of axiologic discussions, one of the dominant ones of our age. When one, however, examines these introductions they are found in most cases to be purely ornamental, or (in the case of writers who, like M. Brunschvicg, take their historicism seriously) they prove only those principles which their author has taken for granted in constructing his history. Indeed, how can anyone possibly organize a large tract of human experience in the way we call history without drawing on his own general ideas or philosophy? Even the doubtful argument that historical facts can speak for themselves could in no way be used here, for in this book we have no complete collection of all the facts, but, at best, a selection of what the author considers typical views.

The solidity of M. Brunschvicg's learning and his undoubtedly keen analytic powers make it rather instructive to note some of the confusion and self-deception to which he is led by the assumption that the history of a branch of philosophy can, apart from the direct analyses of the subject matter, prove anything as to the truth of contending views.

The idea of an instructive history of mathematical thought which presents ' stages,' obviously involves belief in something more than that a careful study of the great masters like Plato, Descartes, or Leibniz is helpful. The latter kind of study need not be chronologic and is obviously futile unless accompanied by an independent vision of the subject matter. The idea of a history of doctrines which, apart from external reflection, can establish philosophic truth must rest on the belief that the time process represents a necessary logical development. It was brought into the history of philosophy by Hegel who consistently with his pan-logism (*i. e.*, all the real is rational) regards history as nothing but a logical unfolding. But though M. Brunschvicg does sometimes speak of certain doctrinal developments as necessary or inevitable owing to the nature of mind (*e. g.*, p. 369), he is certainly not a conscious panlogist. His actual account of the development of mathematical thought, at any rate, has more dramatic elements than is possible with an Hegelian solitary actor who has to be his own antagonist and peace-maker. The course of mathematical thought has spontaneity, it offers a thousand accidents of a natural stream (pp. ix, and 452); there have been false starts in the direction of dogmatism since the seventeenth century; great insights like those of Pascal (pp. 429, 439) have long been neglected; there have been unaccountable mental accidents like materialism (p. 307); and, worst of all, the prosperity or persistence of a doctrine is admitted to be no argument for its truth or falsity (p. 342). What doctrinal significance, therefore, remains to the historical order as such? From the standpoint of doctrinal truth must not Liebniz or Plato be judged like contemporaries? (*cf.*, p. 397).

It is, I suppose, perfectly natural and proper for a philosopher, especially one who writes an historical introduction to his views, to characterize his own thought as the final stage or great consummation toward which all creation has moved. But how about the previous stages? Are no crumbs of partial truth to be doled out to the form their services? In spite of the assertion that the originality of the new stage consists in that it does not wish to add a new system of mathematical philosophy, but "turning to history itself, it seeks the convergence and coordination of the results which have been obtained at different periods" (p. 463), M. Brunschvicg's attitude to all previous systems of mathematical philosophy is almost entirely negative. The great lesson which his history teaches him is that we must clear the ground of the a priorism which has always infected mathematical thought, and return to primitive innocence (p. 458). I have tried to show that his refutation of previous philosophers like Russell, is flagrantly inadequate. But at best there can be nothing historical in the refutation of a philosopher who is still vigorously developing his thought. The whole futility of the pretensions of historicism seems to me to be admitted in the following passage, which I quote in the original lest my translation be suspected of interposing a distorting medium: "Au contraire c'est à la condition d'avoir compris d'abord la science qui agit et qui s'étend sous nos yeux, que l'on pourra, éclairé par elle, restituer au passé ce qui a été sa vie et son actualité" (p. 458).

When M. Brunschvicg characterizes the final or present stage of mathematical thought as based on intuition he is unnecessarily projecting the stages of his discourse into a cold and non-compliant world. He argues indeed that mathematics is but the last of the sciences to receive the refreshing and fructifying breath of intuition (pp. 434–437), but he adduces nothing worthy of the name of evidence to show that biologists or physicists have actually changed their methods in accordance with the philosophy of intuition. Nor is it clear how they can possibly do so until we are vouchsafed a more definite explanation of what the method of intuition really means.

I may interpose that I speak here not as a cold or unsympathetic critic. I have myself a sentimental attachment for a doctrine of intellectual intuition to cover the brute fact that we do apprehend intelligible relations that are not sense data, and to call attention to the important problem of immediacy in logic,[1] and I am therefore, ready to bless and be comforted by everyone who comes to speak in the name of my beloved doctrine. But M. Brunschvicg's message completely eludes me.

Intuition is sharply contrasted with logical deduction (pp. 395–396). It is a mental zone not of sense activity or logical reasoning (p. 428), yet it also includes (sensory) spatial intuition and logical deduction (as his remarks on Klein and Descartes indicate, pp. 450–451). Thus being neither sense nor logic and at the same time both it is fittingly characterized as "the profound work of intelligence" (p. 451). Nobody is likely to object to intuition if the latter is defined as "a method appropriate to the specificity of the object" (p. 440), but the only consequence which M. Brunschvicg draws from this is that the method of intuition must replace that of mechanism in physics and biology. But the adherents of mechanism in the latter sciences may well claim that the methods of mechanism are precisely those which are adapted to the specificity of their subject matter.

In the actual development of the details of M. Brunschvicg's own mathematical philosophy the idea of intuition is replaced by the idea of creative intelligence as the key to all the concrete problems of mathematics. Numbers, etc., are viewed as mental creations, and the peculiar harmony or truth which we observe in the fact that the results of our reasoning hold true of nature, is due to the fact that reason and experience are but two stages of the same creative mind or intelligence. So far as this rests on the general doctrine of idealism, it would take us far afield to attempt to discuss it here. I can merely call attention to the fact that the introduction of an omnipotent factor like mind or creative intelligence in no way removes such a problem as the contradictions involved in the notion of a class of all classes.

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[1] Refer to my paper on the "Present Situation in the Philosophy of Mathematics," *Journal of Philosophy*, 1911.

While in the historical portion of his work M. Brunschvicg is sometimes compelled to speak of accidents and failures in the progress of mathematical thought, in his expository book human intelligence seems to have smooth sailing and no resisting medium. Sometimes, indeed, he speaks of mathematical forms as approximations, but as there is no eternal truth outside of the processes of intelligence, it seems impossible to answer the question, approximations to what? In the main the work of the creative intelligence resolves itself into a long game of solitaire.

The motive which leads M. Brunschvicg to this position is quite clear and instructive to follow. Starting with the dogma that all logic is ' analytic,' and the vulgar prejudice that it can in no way help to extend our knowledge, he draws a very sharp distinction between the order of creation or discovery and the order of logic or exposition. In his insistence, however, on the all sufficiency of the order of invention or discovery he forgets or treats with contempt the order of facts.

The facts of mathematical science, however, distinctly refute the assumption of the sterility of deductive procedure. M. Brunschvicg insists that logic comes after " the spontaneous work of genius," and can only consecrate a victory already won or register the defeat. But even so, the implication that such " consecration " or " registration " is completely useless in extending the field of mathematics is absurd, unless we accept the view that genius works most fruitfully when its ideas are most confused. To believe this is really to revive the ancient but pernicious superstition that only the raving and demented are divinely inspired.

I bring this long, ungracious, and perhaps unduly censorious review to a close with the cheerful admission that it gives but a scant indication of the rich content of instructive study and suggestive analysis packed into this volume. The whole volume is written, in the main, with that admirable lucidity and regard for the gist of the matter which is characteristic of the best French exposition. Though the account of mathematical thought becomes more inaccurate as it approaches our own day, the accounts of Descartes, Spinoza, Leibniz and Kant are admirable examples of that painstaking scholarship of which the Germans are still serving as models. But as a positive contribution to the subject its usefulness seems to me vitiated by the naïve acceptance of many of the now fashionable views in philosophy that are really in no way the outcome of laboratory experience or mathematical investigations; and I have deemed it worth while to call attention in this review to the difficulties of at least three of these fashionable views, viz., (1) the belief that logic, and reflective or 'dogmatic' thought are useless or worse, (2) the disbelief in or disregard of the Aristotelian distinction of that which is prior for us from that which is prior in nature, and (3) the wide-spread delusion that we can dodge the responsibility of a direct examination of the facts of a situation by coming in through the back door of history. Whatever may be the vices of modern logistic philosophy of mathematics, its adherents have at least tried to keep in mind the canons of scientific proof, and to eschew the rhetorical appeals which tend to make philosophy an irresponsible affair.

MORRIS R. COHEN.

COLLEGE OF THE CITY OF NEW YORK.

Kant et Aristote. Par CHARLES SENTROUL. Louvain, Institut Supérieur de Philosophie; Paris, Félix Alcan, 1913.—pp. viii, 343.

This volume is the second French edition of the author's *L'Objet de la Métaphysique selon Kant et selon Aristote,* published in 1905, (which the present reviewer has not had the opportunity of seeing). The present title is, of course, more concise than precise. Actually undertaking a comparison only of two epistemologies, Professor Sentroul's work was crowned by the *Kantgesellschaft* in its prize-essay contest of 1906 on the subject: *Kant's Begriff der Erkenntnis verglichen mit dem des Aristoteles.*

The author, a former student of Cardinal Mercier at the École St. Thomas, Louvain, and a professor at Saô Paulo, Brazil, frankly champions the Stagirite. In contrast to the irreconcilable dualism which he sees in Kant's theory of knowledge, he points to the coherent epistemological structure of Aristotle. In the introductory first chapter, a general survey is attempted of the two theories; this is followed by a chapter on Aristotle's dogmatic realism, four chapters on Kant's theory of knowledge, and a final chapter on Aristotle's metaphysics. While the two philosophies are constantly compared in the treatment of the particular problems, Kant's system is accorded almost twice as much space as Aristotle's.

The Peripatetic epistemology defines truth as the judging of things as they really are. Is logical truth, then, the *adaequatio rei et intellectus?* Professor Sentroul objects to this formula (*arei*), in spite of the sanction which tradition has lent it. In the first place he finds no textual justification of it either in Aristotle or in St. Thomas; besides